

PATENT
Application Serial No. 09/354,640
Attorney Docket No. 0023-0118

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A network for forwarding packets from a source device to a destination device, said network including a plurality of network elements including a plurality of nodes and connecting links, a master server for monitoring the network and establishing an initial route between the source device and the destination device the plurality of nodes including at least one alternative-route-enabled node and at least one non-alternative-route-enabled node, wherein the at least one of the nodes non-alternative-route-enabled node comprises:

~~a processor to compute at least one alternative route for the initial route by identifying one or more alternative route enabled nodes, identifying downstream network elements, and generating the at least one alternative route based on the identified one or more alternative route enabled nodes and the identified downstream network elements;~~

a storage space to store ~~[[the]]~~ an initial route ~~and the at least one alternative route from the source device to the destination device;~~

a mechanism to detect failure in a downstream network element in the initial route; and

a forwarder to automatically forward a packet ~~to the next node on one of the at least one alternative route~~ failure message upstream along the initial route to an alternative-route-enabled node, the failure message causing the alternative-route-enabled node to begin forwarding packets on an alternative route.

PATENT

Application Serial No. 09/354,640

Attorney Docket No. 0023-0118

2. (original) The node in claim 1, wherein the network is a connection-oriented network with a plurality of established initial routes.

3. (currently amended) The node in claim 2, wherein the ~~node is~~ plurality of nodes includes a label-switched router.

4. (currently amended) The node in claim 1, wherein the ~~processor computes an~~ alternative route does not including include the downstream network element in the initial route.

5. (canceled)

6. (original) The node in claim 1, wherein the mechanism to detect failure sends communication packets to downstream nodes at regular intervals.

7. (canceled)

8. (currently amended) A method for forwarding packets from a source device to a destination device in a network of interconnected elements including nodes and links, comprising:

determining an initial route, the initial route including at least one alternative-route enabled node and at least one non-alternative-route-enabled node;

determining an alternative route by identifying ~~one or more~~ the at least one

PATENT

Application Serial No. 09/354,640

Attorney Docket No. 0023-0118

alternative-route-enabled ~~nodes~~ node in the initial route, identifying downstream interconnected elements, and generating the alternative route based on the identified at least one or more alternative-route-enabled ~~nodes~~ node and the identified downstream interconnected elements;

forwarding packets on the initial route;

detecting a failed element; and

automatically forwarding packets on the alternative route without communicating with either the source or the destination.

9. (original) The method of claim 8, wherein determining the initial route further comprises:

determining a short path from the destination device to the source device within the network;

refining the path according to administrative constraints; and

establishing the path as the initial route.

10. (original) The method of claim 9, wherein refining the path comprises rejecting the path exceeding bandwidth allocation and hop limit.

11. (original) The method of claim 8, wherein determining the alternative route further comprises:

determining a shortest route from a node preceding the failed element to the destination device within the network;

PATENT

Application Serial No. 09/354,640

Attorney Docket No. 0023-0118

refining the route to exclude the failed element on the initial route; and
establishing the alternative route for forwarding packets.

12. (original) The method of claim 8, wherein detecting a failure is conducted locally by a node preceding the failed element without requiring notification of a master server or an ingress node.

13. (original) The method of claim 8, wherein determining the alternative route comprises:

reserving bandwidth available on the initial route;
generating the alternative route by invoking a routing protocol;
refining the alternative route by excluding the failed element; and
establishing the alternative route.

14. (previously presented) A method for forwarding packets from a source device to a destination device in a network of interconnected elements including nodes and links, comprising:

determining an initial route by determining a short path from the destination device to the source device within the network, refining the path according to administrative constraints, and establishing the path as the initial route, the initial route being prioritized to establish a hierarchy for preemption in routing network traffic;

determining an alternative route;

PATENT

Application Serial No. 09/354,640

Attorney Docket No. 0023-0118

forwarding packets on the initial route;
detecting a failed element; and
automatically forwarding packets on the alternative route without communicating with either the source or the destination.

15. (original) The method of claim 8, wherein the determining the alternative route comprises checking bandwidth allocation.

16. (original) The method of claim 15, wherein checking bandwidth allocation comprises dynamically balancing capacity of nodes and links.

17. (currently amended) The method of claim 8, wherein determining the alternative route comprises:

reserving bandwidth available on the initial route;
identifying a plurality of nodes associated with the failed [[node]] element according to network configuration information;
generating the alternative route excluding the failed [[node]] element and the plurality of nodes;
establishing the alternative route.

18. (currently amended) A method for locally rerouting packets traveling on an established route when a node in a network of interconnected nodes fails, the method

PATENT

Application Serial No. 09/354,640

Attorney Docket No. 0023-0118

comprising:

computing, at select intermediary nodes along the established route, an alternative route leading from the ~~computing~~ select intermediary node to the destination device of the established route;

storing, at each of the select intermediary nodes, the alternative route;

determining locally that the established route has failed; and

automatically forwarding packets on the alternative route.

19. (currently amended) The method of claim 18, wherein computing the alternative route comprises:

reserving bandwidth available on the ~~initial~~ established route;

identifying a plurality of nodes associated with the failed node according to network configuration information;

generating the alternative route excluding the failed node and the plurality of nodes; and

establishing the alternative route.

20. (currently amended) The method of claim 19, wherein computing the alternative route further comprises:

locating a set of established routes with a same destination device and same administrative constraints as the ~~initial~~ established route;

finding a common node, downstream from the failed node, after which the set of

PATENT
Application Serial No. 09/354,640
Attorney Docket No. 0023-0118

established routes and the ~~initial~~ established route utilize the same network elements;
establishing a new route from the common node to the destination device; and
incorporating the new route into the alternative route.

21. (original) The method of claim 18, wherein determining locally that the established route has failed is conducted by a signaling protocol.

22. (canceled)

23. (canceled)

24. (previously presented) A network for forwarding packets from a source device to a destination device and including a plurality of intermediate network nodes, the plurality of intermediate network nodes comprising:

at least one first node configured to:

store an initial route from the source device to the destination device and

at least one alternative route from the source device to the destination device,

detect a failure in a downstream network node in the initial route, and

automatically forward a packet to a node on one of the at least one alternative route in response to detecting the failure; and

at least one second node configured to:

store the initial route,

PATENT

Application Serial No. 09/354,640

Attorney Docket No. 0023-0118

detect a failure in a downstream network node in the initial route, and
forward a failure message to an upstream first node in response to
detecting the failure, the failure message causing the upstream first node to automatically
forward a packet to a node on one of the at least one alternative route.